भारतीय मानक
Indian Standard

IS 17568 : 2021

थर्मल पेपर — विशिष्टि

Thermal Paper — Specification

ICS 85.080

© BIS 2021

भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुरशाह ज़फर मार्ग, नई दिल्ली – 110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI-110002
www.bis.gov.in www.standardsbis.in

July 2021 **Price Group 3**

Paper and its Products Sectional Committee, CHD 15

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards after the draft finalized by the Paper and its Products Sectional Committee, had been approved by the Chemical Division Council.

Thermal paper is a special paper type that is manufactured with specialty coating that aids in inkless printing. On application of heat to the coating, a clear image is formed on the paper with no requirement for ribbons or inks. The coating usually turns black on heating, which, in turn, transfers the image to the paper. Thermal paper is the key component of thermal paper printing, which is considered one of the most economical printing technologies owing to its low energy consumption and low maintenance cost.

Thermal printing is used in many applications such as point of sales solutions for the printing of invoices, ATM and credit card slips and parking tickets, labels as well as print solutions for specialized applications, for example in healthcare (ECG's), ultrasound and prescriptions.

There is no ISO standard on this subject. The technical committee responsible for development of standards on paper and its products has developed this standard based on ingenious practices.

The composition of technical committee responsible for formulation of this standard is given in Annex A.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

THERMAL PAPER — SPECIFICATION

1 SCOPE

This standard prescribes the requirements, method of sampling and test for thermal paper.

2 REFERENCES

The Indian Standards listed below contain provisions which through reference in this text, constitute provisions of this Indian Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this Indian Standard are encouraged to investigate the possibility of applying the most recent editions of the Indian Standards.

IS No.	*Title*
1060 (Part 1) : 1966	Methods of sampling and test for paper and allied products: Part 1
1060 (Part 3) : 1969	Methods of sampling and test for paper and allied products: Part 3
1060 (Part 5/Sec 5) : 2014/ISO 536 : 2012	Methods of sampling and test for paper and allied products: Part 5 Methods of test for paper and board, Section 5 Determination of grammage
1060 (Part 5/Sec 6) : 2014/ISO 1924-2 : 2008	Methods of sampling and test for paper and allied products: Part 5 Methods of test for paper and board, Section 6 Determination of tensile properties — Constant rate of elongation method (20 Mm/min)
1060 (Part 6/Sec 1) : 2014/ISO 1974 : 2012	Methods of sampling and test for paper and allied products: Part 6 Methods of test for paper, Section 1 Determination of tearing resistance — Elmendorf method
1060 (Part 4/Sec 13) : 2020/ISO 2470-1 : 2016	Methods of sampling and test for paper and allied products: Part 4 Methods of test for paper, board and pulps, Section 13 Measurement of diffuse blue reflectance factor — Indoor daylight conditions (ISO brightness)
IS/ISO 2471 : 2008	Paper and board — Determination of opacity (paper backing) — Diffuse reflectance method
4661 : 1999	Glossary of terms used in paper trade and industry
IS/ISO 8254-1 : 1999	Paper and board — Measurement of specular gloss: Part 1 75° Gloss with a converging beam, TAPPI method
9894 : 1981	Method of test for smoothness/roughness of paper

3 TERMINOLOGY

For the purpose of this standard, the definitions given in IS 4661 shall apply.

4 REQUIREMENTS

4.1 General

The paper shall be of uniform formation, thickness and substance. The paper shall be evenly finished and generally free from holes, specks and other blemishes.

4.2 The paper shall also comply with the requirements given in Table 1, 2, 3 and 4 when tested in accordance with the method referred to in Col. 4 of Table 1, 2, 3 and 4.

4.3 Grammage

The grammage of the thermal paper shall be as agreed to between the purchaser and the supplier. However when tested as per IS 1060 (Part 5/Sec 5), no single test result shall vary by more than ± 6 percent from nominal grammage. Further a mean of 10 test results shall not vary from nominal grammage by more than ± 5 percent.

4.4 The thermal paper shall be free from Bisphenol A (BPA).

5 PACKING AND MARKING

5.1 Packing

Thermal paper may be supplied in ream or rolls as agreed to between the purchaser and the supplier. Packages of rolls shall contain rolls of the size (width) and mass of the paper packed as agreed between the purchaser the supplier. The final packing should protect the thermal paper from heat, light and humidity.

5.2 Marking

5.2.1 Each package shall be marked with the following information:

a) Description and grammage of the material,
b) Size of paper in mm, and length in meter.
c) Lot number,
d) Month and year of manufacture, and
e) Manufacturer's name or recognized trade-mark.

5.2.2 *BIS Certification Marking*

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed there under, and the products may be marked with the Standard Mark.

6 SAMPLING

Representative samples for the test shall be drawn as prescribed in **3** of IS 1060 (Part 1).

7 CRITERIA FOR CONFORMITY

7.1 Tests

From each of the roll, selected from the lot (*see* 6), one sheet shall be taken out at random. These sheets shall constitute the sample. The sheets selected shall first be tested for general requirements given in **4.1**. One test piece shall be cut from each sheet selected for each of the characteristics mentioned in **4.2** and **4.4**.

7.2 A sheet not meeting the relevant requirements for anyone or more characteristics shall be considered as defective.

7.3 A lot shall be declared as conforming to the requirements of this specification if the number of defective sheets found, does not exceed the acceptance number. This acceptance number is zero for the requirement of substance and for all other requirements depends upon the size of the sample and shall be equal to zero if the size is less than 13 and one if the size is greater than or equal to 13.

Table 1 Requirement for Thermal Paper - Thermal Coated Paper Properties

(*Clause* 4.2)

Sl No.	**Characteristics**	**Requirement**	**Method of Test.**
(1)	(2)	(3)	(4)
(A)	**Paper Properties**		
i)	Tensile Index, Nm/g		IS 1060 (Part 5/Sec 6)
	MD	30	
	CD	20	
ii)	Tear Index, m N.m^2/g		IS 1060 (Part 6/Sec 1)
	MD	3.5	
	CD	4.0	
iii)	Opacity, Percent, Min	85	IS/ISO 2471
iv)	Brightness ISO, Percent, Min	80	IS 1060 (Part 4/Sec 13)
v)	Gloss at 75° , Max	35	IS/ISO 8254 (Part 1)
vi)	Smoothness (Bendtsen) ml/min, Max		3 of IS 9894
	Thermal side	50	
	Reverse side	100	
v)	Wax Pick , Min	No pick on 8 A	8 of IS 1060 (Part 3)
(B)	**Image Properties**		
i)	Static Thermal Color Image Density, Min		Press the recording paper by heated block, applying pressure of 1.0 kg/cm^2 for 3 seconds on TH-PSA (pressure sensitive) static machine. Measure image density on Macbeth densitometer
	• At 80$\pm$5 °C ,immediate	0.16 $\pm$ 0.02	
	• After 1 hr maturation	0.20 $\pm$ 0.02	
	• At 90$\pm$5 °C, immediate	0.40 $\pm$ 0.02	
	• After 1 hr maturation	0.50 $\pm$ 0.02	
	• At 100$\pm$5 °C, immediate	0.60 $\pm$ 0.02	
	• After 1 hr maturation	0.70 $\pm$ 0.02	
ii)	Dynamic Thermal Color Image Density, Min	0.80 $\pm$ 0.02	Take out the jet black prints from fax machine at Speed $\leq$300 mm/s with energy of thermal head 0.35 mJ/dot. Measure image density on Macbeth densitometer.
iii)	Back Ground Thermal Color Image Density, Min	0.05 $\pm$ 0.02	Measure image. Density value on unprinted thermal coating side of paper by Macbeth densitometer.

Table 2 Requirement for Thermal Paper- Thermal Properties

(*Clause* 4.2)

Sl No.	Characteristic	Requirement	Test Method
(1)	(2)	(3)	(4)
1.	Imaging colour	Jet black	Visual-after image development
2.	Static colour development properties		
(i)	ID in initial temperature		Press the recording paper by heated block with the pressure of 1.0 kg/cm^2 for 3 s (Test values depend on instant when Image produced on TH-PSA static machine) Measure the I.D. on Macbeth Densitometer. (I.D. = Image Density)
	• Immediately at 80 ± 5 °C	0.16 ± 0.02	
	• After 1 h maturation of the print	0.20 ± 0.02	
ii)	ID in effective Temperature		
	• Immediately at 90 ± 5 °C	0.40 ± 0.02	
	• After 1 h maturation of print	0.50 ± 0.02	
iii)	ID in saturated Temperature		
	• Immediately at 100 ± 5 °C	0.60 ± 0.02	
	• After 1 h maturation of print	0.70 ± 0.02	
3.	Dynamic colour development properties		
i)	ID at effective temperature (90 ± 5 °C)	0.80 ± 0.02	Take out jet black prints from fax machine at speed ≤ 300 mm/s (energy of thermal head 0.35 mJ/dot). Measure ID value on Macbeth densitometer
ii)	Clarity of lines	Should be clear	By visual observation-Print of lines taken from fax
4.	Back ground ID	0.05 ± 0.02	Measure I.D. value on unprinted thermal coating side of paper by Macbeth densitometer.
5.	Bar code print result	Good (lines should not break or be hazy)	By visual observation: Print taken from bar code machine at speed ≤ 300 mm/s. (energy of thermal head 0.35 mj/dot).

Table 3 Requirement for Thermal Paper- Climatic Durability

(*Clause* 4.2)

Sl No.	Characteristic	Drop in ID, Percent (Image Loss)	Test Method
(1)	(2)	(3)	(4)
i)	Heat resistance	Less than 30	Condition the paper image in Oven at 60 °C for 24 h. Calculate I.D. before and after conditioning on Macbeth densitometer.
ii)	Humidity resistance	Less than 10	Condition the paper image in humidity chamber at temperature 40 °C and relative humidity 90 percent for 24 h. Calculate I.D. before and after conditioning on Macbeth densitometer.
iii)	Light resistance	Less than 10	Condition the paper image in light resistance tester at 5 000 Lux for 100 h. Calculate I.D. before and after conditioning on Macbeth densitometer.

Table 4 Requirement for Thermal Paper - Chemical Durability

(*Clause* 4.2)

S lNo.	Characteristic	Drop in ID, Percent	Test Method
(1)	(2)	(3)	(4)
i)	Lanolin hand cream	Less than 20	Apply the cream on image produced by fax machine and keep it for 24 hours at room temperature. Calculate I.D. before and after exposure on Macbeth densitometer..
ii)	Ethanol	Less than 25	Immerse the paper image in 25 percent solution for 20 min. Then remove it from solution and keep it for 24 h at room temperature. Calculate I.D. before and after treatment on Macbeth densitometer.
iii)	Plasticizer	Less than 45	Keep the paper image in the plastic bag with plasticizer under the load of 60 g/cm^2. Then keep the image for 24 h in room temperature after removing from the plastic bag. Calculate I.D. before and after exposure on Macbeth densitometer.
iv)	Water fastness	Less than 45	Immerse the paper image in demineralized water at room temperature for minimum 3 h. Calculate I.D. before and after immersion on Macbeth densitometer.

ANNEX A

(*Foreword*)

COMMITTEE COMPOSITION

Paper and its related products Sectional Committee, CHD 15

Organization	*Representative(s)*
Central Pulp & Paper Research Institute, Saharanpur	Dr B. P. Thapliyal (***Chairman***)
Avantha Centre for Industrial Res & Development, Yamuna Nagar	Dr Nishikant Bhardwaj
Ballarpur Industries Ltd, New Delhi	Shri Shamim Ahmad Shri V. V. Patharkar (*Alternate*)
Central Pulp & Paper Research Institute, Saharanpur	Dr A. K. Dixit Dr Sanjay Tyagi (*Alternate* I) Shri Alok Kumar Goel (*Alternate* II)
Central Revenues Control Laboratory, New Delhi	Shri K. C. Agrawal Shri Praful Prabhakar Dalal (*Alternate*)
Century Pulp and Paper Mills, Distt Nainital	Shri Sanjay Kumar Yadav Shri Sunesh Yadav (*Alternate*)
Directorate of Printing, Min of Urban Development, New Delhi	Shri A. K. Bansal Shri T. K. Manna (*Alternate*)
DPIIT, Min of Commerce & Industry, New Delhi	Fresh Nomination Awaited
Federation of Indian Agro Paper Mills	Nomination Awaited
DRDO Metcalfe House, New Delhi	Dr D. N. Tripathi Dr R. K. Tiwari (*Alternate*)
Federation of Paper Traders Association of India, Mumbai	Shri Dalip Bindal Shri Piyush Jain (*Alternate*)
Forest Research Institute, Dehradun	Dr Vikas Rana Dr P. K. Gupta (*Alternate*)
Government printing, West Bengal	Shri Subir Kumar Mandal
Indian Agro and Recycled Paper Mills Association, New Delhi	Shri P. G. Mukundan Dr M. Patel (*Alternate*)
Indian Institute of Packaging, Mumbai	Fresh Nomination Awaited
Indian Institute of Technology, Roorkee	Dr Chhaya Sharma Dr Vibhore Kumar Rastogi (*Alternate* I) Dr Kirtiraj K. Gaikwad (*Alternate* II)
Indian Paper Manufacturers Association, New Delhi	Mr Biswaranjan Dash Mr Rohit Pandit (*Alternate*)
Indian Newsprint Manufacturers Association, New Delhi	Shri Vijay Kumar Shri Ashish A. Gupta (*Alternate* I) K. Rajkumar (*Alternate* II)
Indian Pulp and Paper Technical Association, Saharanpur	Shri Sanjay K. Singh Shri Mohan Krishna Goyal (*Alternate*)
Indian Recycled Paper Mills Association, New Delhi	Shri R. C. Rastogi
J K Paper Ltd, New Delhi	Shri Mahesh Narayan Bhat
Kumarrappa National Handmade Paper Institute, Jaipur	Shri Ashwini Sharma Ms Saakshy (*Alternate*)

Organization	*Representative(s)*
Ministry of Defence (DGQA)	Dr S. Soni Shri A John (*Alternate*)
Ministry of Railways, Railway Board, New Delhi	Shri C. Ravindran
NCERT, New Delhi	Shri Arun Chitkara
Pulp and Paper Research Institute, Jaykaypur, Orissa	Shri S. K. Pradhan Dr S. P. Singh (*Alternate*)
Security Printing and Minting Corporation of India limited	Chief Manager (Tech. Op.) DGM (Tech), Hoshangabad (*Alternate*)
Seshasayee Paper & Boards Limited, Erode	Shri A. K. Mehrotra Dr. P. Marimuthu (*Alternate*)
Shree Mangal (Trade) Enterprises	Shri Narottam Vyas Ms Bhawna Vyas (*Alternate*)
Stationery Office, Govt of India, Kolkata	Shri Jalis Ahmed Shri Swapan Kanti Ghosh (*Alternate*)
Tamilnadu Newsprint and Papers Ltd, Tamilnadu	Shri P. Sankaralingam Shri N K Periasamy (*Alternate*)
Voluntary Organization in Interest of Consumer Education, New Delhi	Shri M. A. U. Khan Shri H. Wadhwa (*Alternate*)
Whale Stationery Products Ltd, New Delhi	Shri Mukesh Gupta Shri Gaurav Goel (*Alternate*)
BIS Directorate General	Shri A. K. Lal, Scientist ‘E’ and Head (CHD) [Representing Director General (*Ex-officio*)]

Member Secretary

Shrishti Dixit
Scientist ‘D’ (CHD), BIS

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act*, 2016 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Director (Publications), BIS.

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards: Monthly Additions'.

This Indian Standard has been developed from Doc No.: CHD 15 (15168).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones: 2323 0131, 2323 3375, 2323 9402 *Website*: www.bis.gov.in

Regional Offices:		*Telephones*
Central	: Manak Bhavan, 9 Bahadur Shah Zafar Marg NEW DELHI 110002	2323 7617 2323 3841
Eastern	: 1/14 C.I.T. Scheme VII M, V.I.P. Road, Kankurgachi KOLKATA 700054	2337 8499, 2337 8561 2337 8626, 2337 9120
Northern	: Plot No. 4-A, Sector 27-B, Madhya Marg CHANDIGARH 160019	265 0206 265 0290
Southern	: C.I.T. Campus, IV Cross Road, CHENNAI 600113	2254 1216, 2254 1442 2254 2519, 2254 2315
Western	: Manakalaya, E9 MIDC, Marol, Andheri (East) MUMBAI 400093	2832 9295, 2832 7858 2832 7891, 2832 7892

Branches : AHMEDABAD. BENGALURU. BHOPAL. BHUBANESHWAR. COIMBATORE. DEHRADUN. DURGAPUR. FARIDABAD. GHAZIABAD. GUWAHATI. HYDERABAD. JAIPUR. JAMMU. JAMSHEDPUR. KOCHI. LUCKNOW. NAGPUR. PARWANOO. PATNA. PUNE. RAIPUR. RAJKOT. VISAKHAPATNAM.

Published by BIS, New Delhi